



019-48-6350

Express Mail Label No.: ET817713435 US

UTAH STATE UNIVERSITY

Curriculum Vitae
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

NAME Robert S. Brown

DATE AND PLACE OF BIRTH June 22, 1956 Medford, Massachusetts

EDUCATION

Ph.D. Analytical Chemistry, Virginia Polytechnic Institute and State University, 1983
B.S. Chemistry, University of Massachusetts at Lowell, 1978

AREAS OF SPECIAL INTEREST

Study of fundamental and applied aspects of mass spectrometry (particularly TOF-MS and FT-MS) of large molecules. Application of mass spectrometry to various chemical problems, with particular emphasis on biochemically relevant systems. Development of laser based ionization methods for mass spectrometry and their application to non-volatile sample characterization. Study of the fundamental processes involved in the matrix assisted laser desorption/ionization (MALDI) process. Synthesis of new MALDI matrix materials. New instrumental designs for TOF-MS. Ion detection processes of large m/z ions. Polymer and biopolymer structural characterization utilizing mass spectrometry.

PROFESSIONAL EXPERIENCE

Associate Professor, Utah State University, 6/98 - Present
Assistant Professor, Utah State University, 1/94 - 6/98
Assistant Professor, Colorado State University, 8/87 - 12/93
Postdoctoral Research Associate, University of Calif., Riverside 8/83 - 6/87

HONORS

Graduation cum laude, University of Lowell, 1978
Research Fellowship, Virginia Polytechnic Institute and State University, 1978-1980
Associate Member, Sigma XI

PROFESSIONAL SOCIETY AFFILIATIONS

American Chemical Society
American Society for Mass Spectrometry
Society for Applied Spectroscopy
Protein Society

RECEIVED
JUL 29 2003
GROUP 1700

UNIVERSITY AND DEPARTMENTAL COMMITTEE ASSIGNMENTS

Graduate Admissions Committee	January 1994 - August 1996
Curriculum Committee	January 1994 - May 1997
Organic Search Committee (Chairman)	June 1995 - January 1996
Building & Space Committee	August 1996 - June 1999
Building & Space Committee (Chairman)	May 1998 - June 1999
Visiting Speakers Committee	May 1997 - June 1998
Graduate Studies Committee	May 1997 - July 2001
Graduate Studies Committee (Chairman)	May 1999 - July 2001
P & T Committee - Prof. Lisa Berreau	January 1998 - Present
Advisory & Evaluation Committee	
Dr. Zhihua Shen (Instructor)	September 1999 - June 2001
Departmental Library Committee	May 1999 - 2000
Shimadzu Analytical Laboratory Director	March 2000 - Present
College of Science Dean Search Committee	April 2000 - June 2001
Advisory Committee	June 2000 - Present
Advisory Committee (Chairman)	June 2000 - June 2001
Analytical Search Committee (Chairman)	July 2000 - May 2002
Lab Manager Search Committee	July 2000 - Spring 2001
General Chemistry Steering Committee	July 2000 - Present
P & T Committee - Prof. Tom Chang	January 2000 - Present
P & T Committee - Prof. Phil Silva	September 2002 - Present

TEACHING ASSIGNMENTS (Credits)

Chemistry 761 - Analytical Separations (3)	Spring 1994
Chemistry 780 - Physical-Analytical Seminar (1)	Spring 1994
Chemistry 123 - Principles of Chemistry (3)	Fall 1994
Chemistry 160 - Quantitative Analysis I (2)	Fall 1994
Chemistry 662 - Analytical Chemistry (3)	Spring 1995
Chemistry 160 - Quantitative Analysis I (2)	Spring 1995
Chemistry 780 - Physical-Analytical Seminar (1)	Fall 1995
Chemistry 761 - Analytical Separations (3)	Winter 1996
Chemistry 780 - Physical-Analytical Seminar (1)	Winter 1996
Chemistry 160 - Quantitative Analysis I (2)	Spring 1996
Chemistry 764 - Special Topics in Analytical Chemistry (1)	Spring 1996
Chemistry 360 - Quantitative Analysis II (3)	Fall 1996
Chemistry 361 - Quantitative Analysis Lab (2)	Fall 1996
Chemistry 780 - Physical-Analytical Seminar (1)	Winter 1997
Chemistry 662 - Analytical Chemistry (3)	Spring 1997
Chemistry 764 - Special Topics in Analytical Chemistry (1.5)	Spring 1997
Chemistry 780 - Physical-Analytical Seminar (1)	Fall 1997
Chemistry 121 - Principles of Chemistry (5)	Winter 1998
Chemistry 122 - Principles of Chemistry (4)	Spring 1998
Chemistry 7610 - Chemical Separations (3)	Fall 1998
Chemistry 4990 - Undergraduate Seminar (1)	Fall 1998
Chemistry 7600 - Analytical Spectroscopy (3)	Spring 1999
Chemistry 4990 - Undergraduate Seminar (1)	Spring 1999

Chemistry 4990 - Undergraduate Seminar (1)	Fall 1999
Chemistry 1210 - Principles of Chemistry (4)	Spring 2000
Chemistry 4990 - Undergraduate Seminar (1)	Spring 2000
Chemistry 4990 - Undergraduate Seminar (1)	Fall 2000
Chemistry 7610 - Chemical Separations (3)	Fall 2000
Chemistry 5640 - Instrumental Analysis (3)	Spring 2001
Chemistry 5650 - Instrumental Analysis Lab (2)	Spring 2001
Chemistry 4990 - Undergraduate Seminar (1)	Spring 2001
Chemistry 3600 - Quantitative Chemical Analysis (3)	Fall 2001
Chemistry 3610 - Quantitative Chemical Analysis Lab (1)	Fall 2001
Chemistry 5640 - Instrumental Analysis (3)	Spring 2002
Chemistry 5650 - Instrumental Analysis Lab (2)	Spring 2002
Chemistry 7610 - Chemical Separations (3)	Fall 2002
Chemistry 5640 - Instrumental Analysis (3)	Spring 2003
Chemistry 5650 - Instrumental Analysis Lab (2)	Spring 2003

PROFESSIONAL MEETINGS ATTENDED

<u>Organization</u>	<u>Date</u>	<u>Location</u>
Society of Western Analytical Professors Meeting	Jan. 1988	Pomona, CA
Pittsburgh Conference	Feb. 1988	New Orleans, LA
American Society for Mass Spectrometry Meeting	June 1988	San Francisco, CA
Pittsburgh Conference	March 1989	Atlanta, GA
American Society for Mass Spectrometry Meeting	June 1989	Miami, FL
American Society for Mass Spectrometry Meeting	June 1990	Tucson, AZ
MUACC Meeting	Oct. 1990	Minneapolis, MN
Pittsburgh Conference	March 1991	Chicago, IL
American Society for Mass Spectrometry Meeting	June 1991	Nashville, TN
Rocky Mountain Conference on Analytical Chemistry Meeting	July 1991	Denver, CO
Federation on Analytical Chemistry and Spectroscopy Society Meeting	Oct. 1991	Anaheim, CA
4th Sanibel Conference on Mass Spectrometry	Jan. 1992	Sanibel Island., FL
Pittsburgh Conference	March 1992	New Orleans, LA

PROFESSIONAL MEETINGS ATTENDED (Continued)

American Society for Mass Spectrometry Meeting Desorption'92	June 1992 Sept. 1992	Washington, DC Burg Waldeck, Germany
<u>Organization</u>	<u>Date</u>	<u>Location</u>
Pittsburgh Conference	March 1993	Atlanta, GA
American Society for Mass Spectrometry Meeting	June 1993	San Francisco,
Rocky Mountain Conference on Analytical Chemistry Meeting	August 1993	Denver, CO
Desorption '94	March 1994	Sun River Lodge, OR
1994 Pittsburgh Conference	Feb 27 - Mar 4, 1994	Chicago, IL
42nd American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics	May 29- June 3, 1994	Chicago, IL
36th Rocky Mountain Conference on Analytical Chemistry Mass Spectrometry Symposium	Aug 1994	Denver, CO
1995 Pittsburgh Conference	March 6-9,	New Orleans,
43rd American Society for Mass Spectrometry Conference on Mass Spectrometry & Allied Topics	May 1995	Atlanta, GA
37th Rocky Mountain Conference on Analytical Chemistry Mass Spectrometry Symposium	Aug 1995	Denver, CO
1996 Pittsburgh Conference	March 3-8, 1996	Chicago, IL
44th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics	May 12-16 1996	Portland, OR
38th Rocky Mountain Conference on Analytical Chemistry Mass Spectrometry Symposium	Aug. 1996	Denver, CO
10th Symposium of the Protein Society	Aug. 3-7 1996	San Jose, CA
Desorption '96	Sept. 18-21 1996	Ronne, Denmark

PROFESSIONAL MEETINGS ATTENDED (Continued)

<u>Organization</u>	<u>Date</u>	<u>Location</u>
Eastern Analytical Symposium	Nov. 18-21, 1996	Sommerset, NJ
1997 Pittsburgh Conference	March 16-21, 1997	Atlanta, GA
45th American Society for Mass Spectrometry Conference on Mass Spectrom. & Allied Topics	June 1-5, 1997	Palm Springs, CA
39th Rocky Mountain Conference on Analytical Chemistry Mass Spectrometry Symposium	Aug. 1997	Denver, CO
1998 Pittsburgh Conference	March 1-6, 1998	New Orleans, LA
46th American Society for Mass Spectrometry Conference on Mass Spectrom. & Allied Topics	May 31- June 4, 1998	Orlando, FL
Desorption '98	Sept. 21-26, 1998	Angra dos Reis, Brazil
HPCE Conference	January 24 26, 1999	Palm Springs, CA
1999 Pittsburgh Conference	March 1-6, 1999	Orlando, FL
47th American Society for Mass Spectrometry Conference on Mass Spectrometry & Allied Topics	June 13-18, 1999	Dallas, TX
2000 Pittsburgh Conference	March 1-6, 2000	New Orleans, LA
48th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics	June 11-15, 2000	Long Beach, CA
Desorption 2000	Sept. 3-8, 2000	St. Malo, France
2001 Pittsburgh Conference	March 4-9, 2001	New Orleans, LA
49th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics	May 27-31, 2001	Chicago, IL

PROFESSIONAL MEETINGS ATTENDED (Continued)

<u>Organization</u>	<u>Date</u>	<u>Location</u>
2002 Pittsburgh Conference	March 17-22, 2002	New Orleans, LA
50th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics	June 2-6, 2002	Orlando, FL
Desorption 2002	Sept. 1-5, 2002	Estes Park, CO
Eastern Analytical Symposium	Nov. 18-21, 2002	Somerset, NJ

CONFERENCE PRESENTATIONS

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Alternative Approaches to GC/FT-IR/MS"	Feb. 1988	Pittsburgh Conference
"Mass and Infrared Spectrometry Studies of the Laser Desorption Process"	Oct. 1990	Midwest Universities Analytical Chemistry University of Minnesota
"Comparison of Theoretical and Experimental Peakshapes in Matrix Assisted Laser Desorption Mass Spectrometry"	June 1991	ASMS Meeting Nashville, TN
"Improving Ion Transfer and Detection in Matrix Assisted Laser Desorption of High Mass Biomolecules"	Oct. 1991	FACCS Meeting Anaheim, CA
"Cryogenic Trapping of Laser Desorbed Species Coupled with Fourier Transform Infrared Spectrometry"	Oct. 1991	FACCS Meeting Anaheim, CA
"Identification of Matrix Adduct Ion Species in Matrix Assisted Laser Desorption Mass Spectrometry"	Jan. 1992	4th Sanibel Conference on Mass Spectrometry Sanibel Island, FL
"Maximum Likelihood Data Processing Techniques for Improved Mass Resolution in Matrix-Assisted Laser Desorption"	Mar. 1992	Pittsburgh Conference New Orleans, LA
"Adduct Ion formation Pathways in Matrix Assisted Laser Desorption Mass Spectrometry"	June 1992	ASMS Meeting Washington, D.C.

CONFERENCE PRESENTATIONS (Continued)

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Aspects of Large Ion Detection in Matrix Assisted Laser Desorption Mass Spectrometry"	June 1992	ASMS Meeting Washington, D.C.
"Evaluation of an Electrostatic Analyzer Based Time-Of-Flight Mass Spectrometer for Matrix Assisted Laser Desorption"	Sept. 1992	Desorption '92 Burg Waldeck, Germany
"Kinetic Energy Measurements of Matrix Assisted Laser Desorption Generated Ions With an Electrostatic Analyzer Based Time-of-flight Mass Spectrometer"	June 1993	American Society for Mass Spectrometry and Allied Topics Conference San Francisco, CA
"A Postacceleration Detector for Time-of-flight Mass Spectrometry Utilizing Ion to Photon Conversion"	June 1993	American Society for Mass Spectrometry and Allied Topics Conference San Francisco, CA
"Pulsed Ion Extraction at High Accelerating Fields in a MALDI Time-of Flight Mass Spectrometer"	Mar. 1994	Desorption '94 Sun River Lodge, OR
"Pulsed Ion Extraction Combined with High Accelerating Potentials for Matrix-Assisted Laser Desorption Time-of-Flight Mass Spectrometry"	June 1994	42nd American Society for Mass Spectrometry Conf. on Mass Spectrometry and Allied Topics Chicago, IL
"A Comparison of Various Alpha Substituted Cinnamic Acids as Matrices for Matrix-Assisted Laser Desorption"	June 1994	42nd American Society for Mass Spectrometry Conf. on Mass Spectrometry and Allied Topics, Chicago, IL
"Matrix-Assisted Laser Desorption: How Soft an Ionization Process?"	Mar. 1995	1995 Pittsburgh Conference New Orleans, LA
"Hydroxy Benzophenones: A New Class of MALDI Matrices for Proteins/Peptides"	May 1995	43rd American Society for Mass Spectrometry Conf. on Mass Spectrometry and Allied Topics, Atlanta, GA
"Fast Metastable Ion Fragmentation in MALDI"	May 1995	43rd American Society for Mass Spectrometry Conf. on Mass Spectrometry and Allied Topics, Atlanta, GA

CONFERENCE PRESENTATIONS (Continued)

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Matrix Isolation / FT-IR Spectrometry of Laser Desorbed Neutrals"	June 1995	Regional ACS Meeting Park City, UT
"Metastable Ion Decay in Matrix-Assisted Laser / Ionization"	June 1995	Regional ACS Meeting Park City, UT
"Utilization of MALDI In-Source Decay Ions for Peptide / Protein Sequencing"	Mar. 1996	Pittsburgh Conference Chicago, IL
"Early Time Frame Metastable Ion Decay in MALDI"	May 1996	44th ASMS Conference Portland, OR
"Examination Of The Use Of MALDI In-Source Decay For Sequencing Peptides"	May 1996	44th ASMS Conference Portland, OR
"Characteristics Of Several New Alpha Substituted Cinnamic Acids As MALDI Matrices"	May 1996	44th ASMS Conference Portland, OR
"High Mass Resolution MALDI TOF Mass Spectrometry"	Aug. 1996	38th Rocky Mountain Conf. on Analytical Chemistry, Denver, CO
"Utilization of MALDI Fast Metastable Ion Decay Ions for Peptide / Protein Sequencing"	Aug. 1996	10th Protein Society Symposium San Jose, CA
"Factors Influencing Mass Resolution in Delayed Extraction TOF-MS"	Sept. 1996	Desorption '96 Ronne, Denmark
"New Strategies For Protein Sequencing Using MALDI In-Source Decay"	Mar. 1997	Pittsburgh Conference Atlanta, GA
"Synthesis and Utility of Additional Substituted Cinnamic Acid Derivative as MALDI Matrices"	June 1997	45th ASMS Conference Palm Springs, CA
"A New Instrument Design For MALDI Time-of-Flight Mass Spectrometry"	June 1997	45th ASMS Conference Palm Springs, CA
"Protein Sequencing Strategies Based Upon Enzymatic Cleavage and MALDI In-Source Decay"	June 1997	45th ASMS Conference Palm Springs, CA
"IR-MALDI Employing a Short Pulsewidth Nd:YAG Pumped OPO"	March 1998	1998 Pittsburgh Conf. New Orleans, LA

CONFERENCE PRESENTATIONS (Continued)

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Cinnamic Acid Substitution Effects on MALDI Time-of-Flight Mass Spectrometry Performance"	March 1998	1998 Pittsburgh Conf. New Orleans, LA
"Development of New Co-Matrix Systems for MALDI Mass Spectrometry"	June 1998	46th ASMS Conf. Orlando, FL
"Protein Identification Utilizing In-Source Decay MALDI Data Combined With Database Searching"	June 1998	46th ASMS Conf. Orlando, FL
"IR-MALDI Employing a Short Pulsewidth Nd:YAG Pumped OPO"	June 1998	46th ASMS Conf. Orlando, FL
"Metastable Ion Decay of Peptides and Proteins in MALDI TOF-MS Using IR and UV Desorption"	June 1999	47th ASMS Conf. Dallas, TX
"Metastable Ion Decay of Peptides and Proteins in MALDI TOF-MS Using IR and UV Desorption"	June 2000	48th ASMS Conf. Long Beach, CA
"Metastable Ion Decay of Peptides and Proteins in MALDI TOF-MS Using IR and UV Desorption"	June 2000	48th ASMS Conf. Long Beach, CA
"Fragmentation of Peptides/Proteins In MALDI: A Comparison of IR vs. UV Desorption Wavelengths and Positive vs. Negative Ions"	Sept. 2000	Desorption 2000 St. Malo, France
"Optimizing The Extraction Voltage Waveform To Improve The TLF Focussing Of Ions In Delayed Extraction MALDI"	May 2001	49th ASMS Conf. Chicago, IL
"Ionization In MALDI: Do Solvent Occlusions In Matrix Crystals Play A Role?"	June 2002	50th ASMS Conf. Orlando, FL
"Ionization In MALDI, The Role of Trapped Solvent"	Sept. 1-5, 2002	Desorption 2002 Estes Park, CO

INVITED CONFERENCE PRESENTATIONS

<u>Title</u>	<u>Date</u>	<u>Location</u>
"A Comparison of Deconvolution and Maximum Likelihood Data Processing Techniques Applied to Matrix Assisted Laser Desorption Mass Spectra"	July 1991	Rocky Mountain Conference on Analytical Chemistry Denver, CO

INVITED CONFERENCE PRESENTATIONS (continued)

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Evaluation of an Electrostatic Analyzer Based Time-of-flight Mass Spectrometer"	Aug. 1992	34th Rocky Mountain Conference on Analytical Chemistry Denver, CO
"Evaluation of Pulsed Ion Extraction at High Accelerating Fields in a MALDI Time-of-flight Mass Spectrometer"	Aug. 1993	35th Rocky Mountain Conference on Analytical Chemistry, Denver, CO
"Low Temperature Matrix Assisted Laser Desorption Mass Spectrometry"	Aug. 1993	35th Rocky Mountain Conference on Analytical Chemistry Denver, CO
"Matrix-Assisted Laser Desorption: How Soft an Ionization Process?"	Aug. 1994	36th Rocky Mountain Conference on Analytical Chemistry Denver, CO
"Recent Advances in Matrix Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry"	Aug. 1995	37th Rocky Mountain Conference on Analytical Chemistry Denver, CO
"High Mass Resolution MALDI TOF Mass Spectrometry"	Nov. 1996	Eastern Analytical Symposium Somerset, NJ
"New Protein Sequencing Strategies Using MALDI In-Source Decay"	Aug. 1997	38th Rocky Mountain Conference on Analytical Chemistry Denver, CO
"IR-MALDI Employing a Short Pulsewidth Nd:YAG Pumped OPO"	Sept. 1998	Desorption 98 Conf. Angra dos Reis,
"Sequencing Peptides and Proteins by In-Source and Post-Source Decay"	Jan. 1999	HPCE Conference Palm Springs, CA
"A Review Of Current Mechanistic Models Of The MALDI Process And Their Implications For Developing Successful Sample Analysis Protocols"	Jan. 2002	Sanibel Island Conf. Sanibel Island, Fl

"Towards a Unified Matrix-Assisted Laser Desorption/Ionization Mechanism: Implications of IR-MALDI Studies"

Nov. 2002

Eastern Analytical Symposium
Somerset, NJ

INVITED SEMINARS

<u>Title</u>	<u>Date</u>	<u>Location</u>
"Laser Desorption Mass Spectrometry of Large Molecules"	Nov., 1989	Dept. of Chemistry Tulane University
"Recent Advances in the Mass Spectrometric Analysis of Biological Molecules"	Oct., 1991	Hybritech, Inc. San Diego, CA
"Recent Advances in the Mass Spectrometric Analysis of High Molecular Weight Materials"	April 1991	Sigma Xi CSU
"Recent Development in Matrix Assisted Laser Desorption Mass Spectrometry"	Oct. 1992	Colorado School of Mines
"Utilization of MALDI Fast Metastable Ion Decay Ions for Peptide/Protein Sequencing"	Aug. 1996	Hewlett Packard Co. Palo Alto, CA
"New Developments in MALDI Time-of-flight Mass Spectrometry"	Nov. 1996	University of Georgia
"IR Vs. UV Lasers For Performing Matrix-Assisted Laser Desorption/Ionization: Practical Aspects and Implications For Ionization Mechanisms"	March 2000	Brigham Young U., Provo, UT

FUNDED RESEARCH GRANTS

<u>Title</u>	<u>Donor</u>	<u>Years</u>	<u>Amount</u>
"Study of the Laser Induced Desorption of Non-volatile Material via Matrix Isolation Fourier Transform Infrared Spectrometry"	CSU Faculty Research Grant	1/1/88 - 12/31/88	\$ 3,000
Shell Faculty Development Grant	CSU	6/88 - 6/89	\$ 10,000
"Laser Induced Thermospray Ionization for Pulsed Mass Spectrometers"	NIH	9/89 - 9/90	\$ 33,228

"Laser Desorption Mass Spectrometry: Effects of Various Matrices and Wavelength"	CSU Faculty Research Grant	1/1/90 - 12/31/90	\$ 4,300
"Introduction of Gas Chromatography-Mass Spectrometry in the Undergraduate Curriculum"	NSF	1/1/90 - 6/30/91	\$ 61,053
"Fundamental Studies of Matrix Assisted Laser Desorption Mass Spectrometry"	NIH	9/30/92 - 2/28/96	\$ 296,141
"Frozen Aqueous Matrices For MALDI Mass Spectrometry"	USU Faculty Research Grant	7/1/95 - 6/30/96	\$ 14,160
"In-Source Decay MALDI TOF-MS of Peptides"	Hewlett Packard Company	1/1/96 - 10/1/97	\$ 10,571
"Matrix-Assisted Laser Desorption - Fundamental Studies"	NIH	1/1/97 - 6/30/01	\$ 369,774
"Unrestricted Funds for Matrix-Assisted Laser Desorption Studies"	Perseptive Biosystems	6/01/2000	\$ 10,000
"Unrestricted Funds for Matrix-Assisted Laser Desorption Studies"	Perseptive Biosystems	1/01/2002	\$ 10,000
"Unrestricted Funds for IR-MALDI Development"	Ciphergen Biosystems	11/01/2002	\$ 10,000

DONATED EQUIPMENT FOR SUPPORT OF RESEARCH

<u>Instrumentation Received</u>	<u>Donor</u>	<u>Year</u>	<u>Estimated Value</u>
Computer and electronic measurement equipment	Hewlett Packard Company	1996	\$ 20,000
Fourier Transform Mass Spectrometer (FTMS 2000)	Phillips Petroleum Co.	1997	\$ 350,000
Quadrupole Mass Spectrometer	Phillips Petroleum Co.	1997	\$ 25,000
Voyager MALDI TOF-MS	Perseptive Biosystems	8/2002	\$ 100,000

RESEARCH PROPOSALS IN PREPARATION

<u>Title</u>	<u>Donor</u>	<u>Years</u>	<u>Amount</u>
"New MALDI TOF-MS Instrument Designs"	NIH	12/1/03- 11/30/05	\$ 150,000

PLANNED RESEARCH PROPOSALS

"Fundamentals Studies of Matrix-Assisted Laser Desorption/Ionization"	NSF	1/01/04 - 12/31/06	\$ 290,000
---	-----	-----------------------	------------

PUBLICATIONS

1. R.S. Brown, D.W. Hausler and L.T. Taylor, "Gel Permeation Chromatography of Coal Derived Products with On-Line Infrared Detection", *Anal. Chem.* 52, 1511-1515 (1980).
2. R.S. Brown, D.W. Hausler, R.O. Carter and L.T. Taylor, "Fourier Transform Infrared Spectrometric Detection in the Size Exclusion Chromatographic Separation of Polar Synfuel Material" *Anal. Chem.* 53, 197-201 (1981).
3. R.S. Brown, J.W. Hellgeth, D.W. Hausler and L.T. Taylor, "Coal and Coal Products: Analytical Characterization Techniques", *ACS Symposium Series* 205, 163-183 (1982).
4. R.S. Brown and L.T. Taylor, "Speciation of Intermediate Polar Material in Coal Derived Process Solvents by Liquid Chromatography/Fourier Transform Infrared Spectrometry", *Anal. Chem.* 55, 723-730 (1983).
5. R.S. Brown, J.W. Hellgeth, A.M. Squires, and L.T. Taylor, "The Occurrence and Role of Organometallics in Coal Liquefaction", EPRI Report AP-2980, Project 1696-2 (March, 1983).
6. R.S. Brown and L.T. Taylor, "Microbore Liquid Chromatography with Flow Cell Fourier Transform Infrared Spectrometric Detection", *Anal. Chem.* 54, 1492-1497 (1983).
7. D.A. Laude, G.M. Brissey, C.F. Ijames, R.S. Brown and C.L. Wilkins, "Linked Gas Chromatography/Fourier transform Infrared/Fourier Transform Mass Spectrometry with Integrated Electron Impact and Chemical Ionization", *Anal. Chem.* 56, 1163-1168 (1984).
8. J.W. Hellgeth, R.S. Brown and L.T. Taylor, "Effect of Coal Liquefaction Conditions on the trace Element Content of the Soluble Non-Volatile Product", *Fuel* 63, 453-462 (1984).
9. R.S. Brown and L.T. Taylor, "Detectability of Phenols and Amines by Normal Phase Microbore HPLC-FTIR Employing Highly IR Transparent Solvents", *Chromatographia* 18, 396-400 (1984).

PUBLICATIONS (Continued)

10. D.A. Laude, C.L. Johlman, R.S. Brown, C.F. Ijames and C.L. Wilkins, "Pulsed Valve Chemical Ionization for Gas Chromatography/Fourier Transform Mass Spectrometry", *Anal. Chim. Acta* **178** 67-77 (1985).
11. R.S. Brown, J.R. Cooper and C.L. Wilkins, "Lightpipe Temperature and Other Factors Affecting Signal in Gas Chromatography-Fourier Transform Infrared Spectrometry", *Anal. Chem.* **57**, 2275-2279 (1985).
12. C.L. Johlman, D.A. Laude, R.S. Brown, and C.L. Wilkins, "Pulsed-Valve Reagent Addition for Chemical Ionization Mass Spectrometry: Mass Measurement Accuracy", *Anal. Chem.* **57**, 2726-2728 (1985).
13. D.A. Laude, C.L. Johlman, R.S. Brown and C.L. Wilkins, "Negative Chemical Ionization and Accurate Mass Measurement Applications of a linked Gas Chromatography/Fourier transform Infrared Spectrometry/Fourier transform Mass Spectrometer", *Frens. Z. Anal. Chemie* **324**, 839-845 (1986).
14. R.S. Brown, D.A. Weil and C.L. Wilkins, "Laser Desorption-Fourier Transform Mass Spectrometry for the Characterization of Polymers", *Macromolecules* **19**, 1255-1260 (1986).
15. D.A. Laude, C.L. Johlman, R.S. Brown, D.A. Weil and C.L. Wilkins, "Fourier Transform Mass Spectrometry: Recent Instrument Developments and Applications", *Mass Spectrom Rev.* **5**, 107-166 (1986).
16. R.S. Brown and C.L. Wilkins, "Laser Desorption Fourier Transform Mass Spectrometry of Chlorophyll A and Chlorophyll B", *J. Am. Chem. Soc.* **108**, 2447-2448 (1986).
17. I.C. Bowater, R.S. Brown, J.R. Cooper and C.L. Wilkins, "Maximum Absorbance Algorithm for Reconstruction of Gas Chromatograms from Gas Chromatography/Infrared Spectrometry Data", *Anal. Chem.* **58**, 2195-2199 (1986).
18. E.S. Schmidt, T.C. Bruice, R.S. Brown and C.L. Wilkins, "Oxygen Transfer from an Ozonide to Tetraphenyl-Porphyrin Chromium (III) Chloride", *Inorg. Chem.* **25**, 4799-4800 (1986).
19. R.S. Brown and C.L. Wilkins, "Laser Desorption Fourier Transform Mass Spectrometry of Synthetic Porphyrins", *Anal. Chem.* **58**, 3196-3199 (1986).
20. R.S. Brown and C.L. Wilkins, "Current Status of High Mass Analysis by Fourier Transform Mass Spectrometry", *Mass Spectrometry in the Analysis of Large Molecules*, Edited by C.J. McNeal, John Wiley and Sons, Ltd. (1986).
21. R.S. Brown and C.L. Wilkins, "Analytical Applications of Laser Desorption Fourier Transform Mass Spectrometry", *ACS Symposium Series* **359**, Chapter 8 (1987).

PUBLICATIONS (Continued)

22. R.S. Brown and C.L. Wilkins, "A Cryogenically Cooled Interface for Gas Chromatography/Fourier Transform Infrared Spectrometry", *Anal. Chem.* 60, 1483-1488 (1988).
23. R.S. Brown and C.L. Wilkins, "Laser Mass Spectrometry: Application to Polymer Analysis", (Chapter 1 in *Applications of Lasers in Polymer Science and Technology*, Vol. 4, 1990, CRC Press, Boca Raton, FL).
24. R.S. Brown and N.L. Gilfrich, "Fourier Transform Infrared Spectrometry Coupled with Cryogenic Trapping for the Study of Laser Desorbed Neutrals", *Appl. Spectrosc.* 44, (8), 1399-1404 (1990).
25. R.S. Brown and J.J. Lennon, "Factors Affecting Sensitivity in Lightpipe Gas Chromatography Fourier Transform Infrared Spectrometry Interfaces", *Appl. Spectrosc.* 45 (4), 666-672 (1991).
26. R.S. Brown and N.L. Gilfrich, "Design and Performance of a Matrix Assisted Laser Desorption Time-of Flight Mass Spectrometer Utilizing a Pulsed Nitrogen Laser", *Anal. Chim. Acta.* 248, 541-552 (1991).
27. R.S. Brown and N.L. Gilfrich, "Optimizing Signal and Mass Resolution for Matrix Assisted Laser Desorption Utilizing a Linear Time-of-flight Mass Spectrometer" *Rapid Comm. in Mass Spectrom.* 6(11), 697 (1992).
28. R.S. Brown and N.L. Gilfrich, "Ion Detection limitations to Mass Resolution in Matrix Assisted Laser Desorption Time-of-flight Mass Spectrometry" *Rapid Comm. in Mass Spectrom.* 6(11), 690 (1992).
29. R.S. Brown and N.L. Gilfrich, "Maximum Likelihood Restoration Data Processing Techniques Applied to Matrix Assisted Laser Desorption Mass Spectra", *Appl. Spectrosc.* 47(1), 103 (1993).
30. R.S. Brown and J.J. Lennon, "Mass Resolution Improvement by Incorporation of Pulsed Ion Extraction in a Linear Time-of-Flight Mass Spectrometer", *Anal. Chem.*, 67(13), 1998 (1995).
31. B.L. Carr and R.S. Brown, "Matrix Isolation/Fourier Transform Infrared Spectrometry of Laser-Desorbed Species", *Appl. Spectrosc.*, 49(7), 955 (1995).
32. R.S. Brown and J.J. Lennon, "Sequence Specific Fragmentation of Matrix Assisted Laser Desorbed Protein/Peptide Ions", *Anal. Chem.*, 67(21), 3990 (1995).
33. R.S. Brown, B.L. Carr and J.J. Lennon, "Factors Influencing the Observed Fast Fragmentation of Peptides in Matrix Assisted Laser Desorption", *JASMS*, 7, 225 (1996).
34. R.S. Brown, J. Feng and D.C. Reiber, "Further Studies of In-Source Fragmentation of Peptides in Matrix-Assisted Laser Desorption/Ionization", *Int. J. Mass Spectrom. Ion*

PUBLICATIONS (Continued)

- Processes*, 169-170, 169 (1997).
35. D.C. Reiber, T.A. Grover and R.S. Brown, "Identifying Proteins Using Matrix-Assisted Laser Desorption/Ionization In-Source Fragmentation Data Combined with Database Searching" *Anal. Chem.*, 70(4), 673 (1998).
 36. D.C. Reiber, S. Weinberger, J. Kenny, J. Bailey and R.S. Brown, "Unknown Peptide Sequencing Using Matrix-Assisted Laser Desorption/Ionization and In-Source Decay" *Anal. Chem.*, 70(6), 1214 (1999).
 37. E. E. Durrant and R.S. Brown, "Metastable Ion Decay of Peptides and Proteins in MALDI TOF-MS Using IR and UV Desorption", *The Proceedings of the 47th ASMS Conference on Mass Spectrometry and Allied Topics*, 1058, 1999.
 38. E. E. Durrant and R.S. Brown, "A Comparison of IR-MALDI and UV-MALDI In-Source Decay of Peptides and Proteins", *The Proceedings of the 47th ASMS Conference on Mass Spectrometry and Allied Topics*, 1116, 2000.
 39. C.R. LaPerriere and R.S. Brown, "Use of a Second Extraction Pulse to Improve the TLF Focussing of Ions in Delayed Extraction MALDI", *The Proceedings of the 48th ASMS Conference on Mass Spectrometry and Allied Topics*, 1537, 2000.
 40. C.R. LaPerriere and R.S. Brown, "Optimizing The Extraction Voltage Waveform To Improve The TLF Focussing Of Ions In Delayed Extraction MALDI" *The Proceedings of the 49th ASMS Conference on Mass Spectrometry and Allied Topics*, 2001.

SUBMITTED MANUSCRIPTS

40. J. Feng, E. E. Durrant and R.S. Brown, "Synthesis of Various Substituted Cinnamic Acids and Their Application for Matrix-Assisted Laser Desorption/Ionization of Peptides and Proteins", Submitted for publication in the *Journal of Mass Spectrometry* (revised and resubmitted).
41. J. Feng and R.S. Brown, "Factors Affecting the Extent of Multiple Protonation of Protein Analytes in Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry", Submitted for publication in the *Journal of Mass Spectrometry* (under revision).
42. B. Bennett, V. D'souza, R.S. Brown, R.C. Holz, "The Anti-Angiogenesis Agent Fumagillin does not Coordinate to the Dinuclear Active Site of the Methionyl Aminopeptidase from Escherichia coli." Submitted for publication in the *Journal of the American Chemical Society*.

MANUSCRIPTS IN PREPARATION

43. J. Feng and R.S. Brown, "Development of New Co-Matrix Systems for MALDI Mass Spectrometry", To be submitted for publication in the *Journal of the American Society for Mass Spectrometry*.
45. E. E. Durrant and R.S. Brown, "IR-MALDI Employing a Short Pulsewidth Nd:YAG Pumped OPO", To be submitted for publication in *Analytical Chemistry*.

MANUSCRIPTS PLANNED

46. E. E. Durrant and R.S. Brown, "Effect of Desorption Wavelength on Post-Source Ion Decay in IR-MALDI", To be submitted for publication in *Journal of the American Society for Mass Spectrometry*.
47. E. E. Durrant and R.S. Brown, "Comparison of In-Source Decay Fragmentation Pathways in UV-MALDI and IR-MALDI", To be submitted for publication in *Journal of the American Society for Mass Spectrometry*.

BOOK REVIEWS

1. Review of "Practical Fourier Transform Infrared Spectrometry: Industrial and Laboratory Chemical Analysis", *J. Am.. Chem.. Soc.* 112, 6454 (1990).
2. Review of "Time-of-Flight Mass Spectrometry and Its Applications", *J. Am.. Soc. Mass Spectrom..* 5, 949, (1994).

STUDENT RESEARCHERS SUPERVISED (1987 - Present)

GRADUATE STUDENTS

Nancy Lynn Gilfrich, Ph.D. - May 1992 (CSU)

Thesis Title: "X-ray Fluorescence Macroprobe Analysis of Slates and Matrix Assisted Laser Desorption of Biomolecules"

Bryan Carr, Ph.D. - December 1995 (CSU)

Thesis Title: "Fourier Transform Infrared Spectrometry/Matrix Isolation of Laser Desorbed Species"

John Lennon, Ph.D. - September 1996 (CSU)

Thesis Title: "Delayed Pulsed Ion Extraction MALDI Linear Time-of-Flight Mass Spectrometry"

Duane Reiber, Ph.D. - June 1999 (USU)

Thesis Title: "The Utility of Hydroxy Substituted Benzophenones as MALDI Matrices and Peptide/Protein Sequencing Using Delayed Extraction MALDI Time-of-flight Mass Spectrometry and In-Source Fragmentation"

GRADUATE STUDENTS (Continued)

Jinhua Feng, Ph.D. - June 1999 (USU)

Thesis Title: "Synthesis and Characterization of Substituted Cinnamic Acid Derivatives as Matrices for Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry"

Edward Durrant, Ph.D. - June 2001(USU)

Thesis Title: "Comparison of Ultraviolet and Infrared Matrix-Assisted Laser Desorption Ionization Time-of-Flight Mass Spectrometry"

Craig LaPerriere MS Candidate (Writing thesis – Expected Graduation Spring 2003)

Thesis Title: "Dynamic Delayed Extraction For MALDI TOF-MS"

CURRENT UNDERGRADUATE RESEARCH STUDENTS

Nate Maeser USU Chemistry Undergraduate Student (BS Expected Spring 2003)

FORMER UNDERGRADUATE RESEARCH STUDENTS

John Jones M.S. Oregon State University (1997)

Peter Staples Exchange student from Australia

John Lane Employed by Eli Lilly and Co., St. Louis, MO

Todd Rhea Employed by Spectrace, Ft. Collins, CO

Dawn Richards Present Status Unknown

Dan Meyers Employed by EPA, Denver, CO

PROFESSIONAL SERVICE RELATED ACTIVITIES

NATIONAL SYMPOSIA ORGANIZED

1. "Laser Desorption Ionization - Fundamentals" at the 43rd ASMS Conference on Mass Spectrometry and Allied Topics, May 24, 1995, Atlanta, GA. (Organizer and Session Chair).
2. "MALDI Design and Fundamentals" at the 45th ASMS Conference on Mass Spectrometry and Allied Topics, June 5, 1997, Palm Springs, CA. (Co-Organizer and Session Co-Chair).
3. General Chairman and Program Organizer for the 6th International Desorption Conference (Desorption 2002) held Sept. 1-5, 2002 in Estes Park, CO.
4. Program Organizer for 2002 EAS Analytical Award Symposium Honoring Prof.

Charles Wilkins. Held at EAS meeting, November, 2002, Sommerset, NJ.

OUTSIDE CONSULTING

1. Consultant to Tulane University on the purchase of a high resolution mass spectrometer (Oct. 1989 - June 1990).
2. Consultant to Hybritech, Inc. (Sept. 1991 - June 1994).
3. Consultant to DuPont (Oct. 1994 - Present).
4. Consultant to Hewlett Packard Co. (Jan. 1996 - Oct. 1997).
5. Consultant to Phillips Petroleum Co. (Aug. 1997 - 2001).
6. Consultant to PE Biosystems (June 1999 - Present).
7. Consultant to CIPHERGEN Biosystems (July 2002 - Present)

OUTSIDE STUDY SECTIONS AND REVIEW PANELS

1. National Science Foundation, Directorate for Education and Human Resources, Instrumentation and Laboratory Improvement Program, panel member, January 1991.
2. National Science Foundation, Directorate for Education and Human Resources, Instrumentation & Laboratory Improvement Program, panel chairman, January 1992.
3. National Science Foundation SBRI review panel member, July 1995.
4. National Science Foundation Major Research Instrumentation Program (Bio Instrumentation) review panel member (appointed March 1997 through April 1999).
5. National Institutes of Health - Ad hoc member of Metallobiochemistry Study Section - Spring 1999.
6. National Institutes of Health - Ad hoc member of Metallobiochemistry Study Section, Special Emphasis Panel (BMT SEP) - February 2000.
7. National Institutes of Health - Ad hoc member of Metallobiochemistry Study Section, Special Emphasis Panel (BMT SEP) - June 2000.
8. National Institutes of Health - Ad hoc member of Chemical Instrumentation Special Study Section - Nov. 13, 2000.

PEER REVIEWER FOR THE FOLLOWING AGENCIES

1. NSF (Various divisions including: Chemistry, Biological Instruments, and Chemical Instrumentation)
2. NIH (Outside Reviewer for Metallobiochemistry Study Section)
3. DOD (Army)
4. Environmental Protection Agency
5. DOE

PEER REVIEWER FOR FOLLOWING JOURNALS

1. Analytical Chemistry
2. Journal of the American Society for Mass Spectrometry
3. Analyst
4. Applied Spectroscopy
5. Journal of Mass Spectrometry
6. International Journal of Mass Spectrometry and Ion Processes
7. Rapid Communications in Mass Spectrometry